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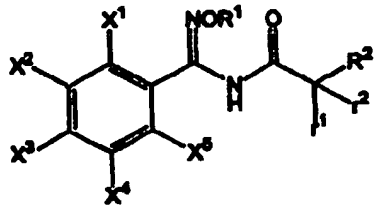
(54) BACTERICIDE COMPOSITION FOR AGRICULTURE AND HORTICULTURE

(57) A novel bactericide composition for agriculture and horticulture comprising a benzamidoxime compound and other bactericides, in particular, a bactericide composition which is characterized in that it comprises, as active compounds, a compound represented by general formula (1), wherein R^1 represents an optionally substituted C_{1-4} alkyl group or the like, R^2 represents an optionally substituted phenyl group or the like, X^1 represents a C_{1-4} haloalkyl group or the like, X^2-X^5 independently represent a hydrogen atom, a halogen atom or the like, r^1 and r^2 represent a hydrogen atom, C_{1-4} alkyl group or the like, as well as a benzimidazole agent, a dicarboxyimide agent, a guanidine agent, an acid amide agent, an anilinopyrimidine agent, cinnamic acid derivatives, a benzoisothiazole agent, a N-phenyl carbamate agent, an organic phosphorus agent and a SBI agent.



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EP 1 077 028 A1

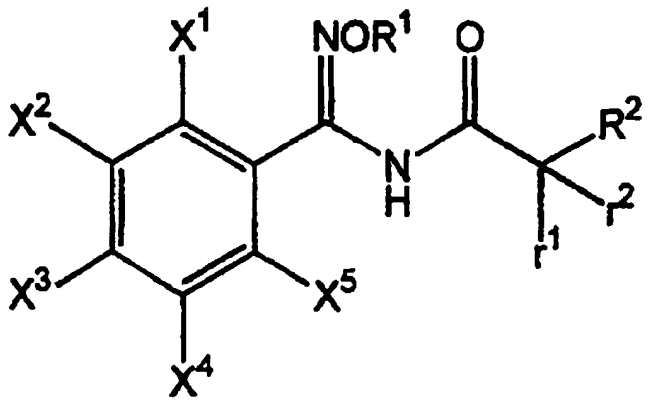
Description

Field of Invention

[0001] The present invention is related to a fungicidal composition for agricultural and horticultural use, and more particularly to a combined fungicidal composition.

Background Art

[0002] Benzamidoxime compounds represented by a general formula (1);



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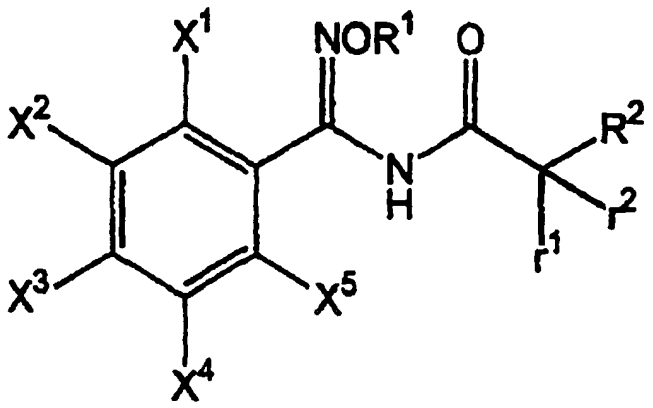
are the compounds disclosed as having fungicidal activity in JP No. 2696342 gazette, WO No. 96/19442 gazette, JP Laid-open Nos. Hei 235262 gazette and Hei 10-67730 gazette, WO No. 99/14187 gazette, WO No. 99/14188 gazette, etc.

[0003] Also, as fungicidal compounds, many compounds, such as benzimidazole compounds, dicarboxyimide compounds, guanidine compounds, acid amide compounds, anilinopyrimidine compounds, cinnamic acid derivatives, benzoisothiazole compounds, N-phenylcarbamate compounds, organophosphorous compounds and SBI type compounds, have been known. However, no combined fungicidal compositions comprising the compound represented by the general formula (1) and a fungicide selected from a group consisting of benzimidazole compounds, dicarboxyimide compounds, guanidine compounds, acid amide compounds, anilinopyrimidine compounds, cinnamic acid derivatives, benzoisothiazole compounds, N-phenylcarbamate compounds, organophosphorous compounds and SBI type compounds showing to have the synergistic fungicidal activity have been reported.

Disclosure of Invention

[0004] It is an object of the present invention to provide a combined fungicidal composition capable of reducing the use dose required for other known fungicides, improving the applicable spectrum range and giving the synergistic activity.

[0005] The present invention is directed to a fungicidal composition characterized by containing as the active ingredients a benzamidoxime compound represented by a general formula (I);



(I)

wherein R^1 represents halogeno, C_{1-4} alkyl optionally-substituted with C_{3-5} cycloalkyl, C_{2-4} alkenyl optionally-substituted with halogeno or C_{2-4} alkynyl optionally-substituted with halogeno,

R^2 represents phenyl optionally-substituted with halogeno, C_{1-4} alkyl or C_{1-4} alkoxy, or a heterocyclic ring optionally-substituted with halogeno, C_{1-4} alkyl or C_{1-4} alkoxy,
X1 represents halogeno, C_{1-4} haloalkyl or C_{1-4} haloalkoxy,
X2, X3, X4 and X5 represent each independently hydrogen, nitro, amino, halogeno, C_{1-4} alkyl, C_{1-4} haloalkyl, C_{1-4} alkoxy, C_{1-4} haloalkoxy, C_{1-4} alkylthio, C_{1-4} alkylsulfinyl, C_{1-4} alkylsulfonyl or C_{1-4} alkylcarbonylamino,
r^1 and r^2 represent each independently hydrogen, amino, halogeno, C_{1-4} alkyl, C_{1-4} haloalkyl, C_{1-4} alkoxy or C_{1-4} alkylthio, or r^1 and r^2 may form in together a carbonyl group, and one or more compounds selected from a group consisting of benzimidazole compounds, dicarboxyimide compounds, guanidine compounds, acid amide compounds, anilinopyrimidine compounds, cinnamic acid derivatives, benzoisothiazole compounds, N-phenylcarbamate compounds, organophosphorous compounds and SBI type compounds.

[0006] The benzamidoxime compound used for the present invention is a compound represented by the general formula (I), and one or more of the benzamidoxime compounds can be used as the active ingredients for the fungicidal composition according to the present invention.

[0007] As the examples for the group represented by R^1, C_{1-4} alkyl, such as methyl, ethyl, propyl, isopropyl, butyl, isobutyl, s-butyl, t-butyl and cyclopropylmethyl, C_{2-4} alkenyl, such as 2-propenyl, allyl, crotyl, 1-butenyl, 2-butenyl and butadienyl, C_{2-4} alkynyl, such as ethynyl, 1-propynyl, 2-propynyl, 1-butynyl, 2-butynyl, 3-butynyl and propagyl, can be given.

[0008] The group represented by R^1 may be substituted with halogeno, such as fluorine, chlorine, bromine and iodine, or C_{3-5} cycloalkyl, such as cyclopropyl, cyclobutyl and cyclopentyl.

[0009] R^2 represents phenyl or a heterocyclic ring, such as pyrazolyl and thienyl.

[0010] The phenyl or the heterocyclic ring described above may be substituted with halogeno, such as fluorine, chlorine, bromine and iodine, C_{1-4} alkyl, such as methyl, ethyl, propyl, isopropyl, butyl, isobutyl, s-butyl, t-butyl and cyclopropylmethyl, or C_{1-4} alkoxy, such as methoxy, ethoxy, propoxy, isopropoxy, butoxy, isobutoxy, s-butoxy, t-butoxy and cyclopropylmethoxy.

[0011] X^1 represents halogeno, such as fluorine, chlorine, bromine and iodine, C_{1-4} haloalkyl, such as fluoromethyl, 1-fluoroethyl, 2-fluoroethyl, difluoromethyl, trifluoromethyl and pentafluoroethyl, or C_{1-4} haloalkoxy, such as fluoromethoxy, 1-fluoroethoxy, 2-fluoroethoxy, difluoromethoxy, trifluoromethoxy and pentafluoroethoxy.

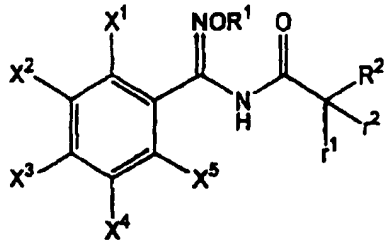
[0012] X^2, X^3, X^4 and X^5 represent each independently hydrogen, nitro, amino, halogeno, such as fluorine, chlorine, bromine and iodine, $_{C1-4}$ alkyl, such as methyl, ethyl, propyl, isopropyl, butyl, s-butyl, t-butyl and cyclopropylmethyl, C_{1-4} haloalkyl, such as fluoromethyl, 1-fluoroethyl, 2-fluoroethyl, difluoromethyl, trifluoromethyl and pentafluoroethyl, C_{1-4} alkoxy, such as methoxy, ethoxy, propoxy, isopropoxy, butoxy, isobutoxy, s-butoxy, t-butoxy and cyclopropylmethoxy, C_{1-4} haloalkoxy, such as fluoromethoxy, 1-fluoroethoxy, 2-fluoroethoxy, difluoromethoxy, trifluoromethoxy and pentafluoroethoxy, C_{1-4} alkylthio, such as methylthio, ethylthio, propylthio and butylthio, C_{1-4} alkylsulfinyl, such as methylsulfinyl and ethylsulfinyl, C_{1-4} alkylsulfonyl, such as methylsulfonyl and ethylsulfonyl, or C_{1-4} alkylcarbonylamino, such as methylcarbonylamino and ethylcarbonylamino.

[0013] r^1 and r^2 represent each independently hydrogen, amino, halogeno, such as fluorine, chlorine, bromine and

iodine, C_{1-4} alkyl, such as methyl, ethyl, propyl, isopropyl, butyl, isobutyl, s-butyl, t-butyl and cyclopropylmethyl, C_{1-4} haloalkyl, such as fluoromethyl, 1-fluoroethyl, 2-fluoroethyl, difluoromethyl, trifluoromethyl and pentafluoroethyl, C_{1-4} alkoxy, such as methoxy, ethoxy, propoxy, isopropoxy, butoxy, isobutoxy, s-butoxy, t-butoxy and cyclopropylmethoxy, or C_{1-4} alkylthio, such as methylthio, ethylthio, propylthio and butylthio, and r^1 and r^2 may form in together carbonyl.

[0014] The benzamidoxime compounds used in the present invention are the compounds represented by the general formula (I), and one or more of the benzamidoxime compounds can be used for the fungicidal composition according to the present invention. In Table 1, particularly preferable examples for the benzamidoxime compounds are presented.

Table 1



(I)

(r^1,r^2=H)

No.	X^1	X^2	X^3	X^4	X^5	R^1	R^2
1	CF_3	H	H	F	F	CH_2-cyclopropyl	Ph
2	CF_3	H	H	Cl	F	CH_2-cyclopropyl	Ph
3	CF_3	H	H	F	Cl	CH_2-cyclopropyl	Ph
4	CF_3	H	H	Cl	Cl	CH_2-cyclopropyl	Ph
5	CF_3	H	H	F	F	CH_2-cyclopropyl	2-F-Ph
6	CF_3	H	H	Cl	F	CH_2-cyclopropyl	2-F-Ph
7	CF_3	H	H	F	Cl	CH_2-cyclopropyl	2-F-Ph
8	CF_3	H	H	Cl	Cl	CH_2-cyclopropyl	2-F-Ph
9	CF_3	H	H	F	F	CH_2-cyclopropyl	2-F-5-Me-Ph
10	CF_3	H	H	Cl	F	CH_2-cyclopropyl	2-F-5-Me-Ph
11	CF_3	H	H	F	Cl	CH_2-cyclopropyl	2-F-5-Me-Ph
12	CF_3	H	H	Cl	Cl	CH_2-cyclopropyl	2-F-5-Me-Ph
13	CF_3	H	H	F	F	CH_2CH_2Cl	Ph
14	CF_3	H	H	Cl	F	CH_2CH_2Cl	Ph
15	CF_3	H	H	F	Cl	CH_2CH_2Cl	Ph
16	CF_3	H	H	Cl	Cl	CH_2CH_2Cl	Ph
17	CF_3	H	H	F	F	CH_2CH_2Cl	2-F-Ph
18	CF_3	H	H	Cl	F	CH_2CH_2Cl	2-F-Ph
19	CF_3	H	H	F	Cl	CH_2CH_2Cl	2-F-Ph

Table 1(Continued)

20	CF_3	H	H	Cl	Cl	CH_2CH_2Cl	2-F-Ph
21	CF_3	H	H	F	F	CH_2CH_2Cl	2-F-5-Me-Ph
22	CF_3	H	H	Cl	F	CH_2CH_2Cl	2-F-5-Me-Ph
23	CF_3	H	H	F	Cl	CH_2CH_2Cl	2-F-5-Me-Ph
24	CF_3	H	H	Cl	Cl	CH_2CH_2Cl	2-F-5-Me-Ph
25	$OCHF_2$	H	H	H	F		Ph
26	$OCHF_2$	H	H	F	F		Ph
27	$OCHF_2$	H	H	H	F		4-F-Ph
28	$OCHF_2$	H	H	F	F		4-F-Ph
29	$OCHF_2$	H	H	F	F		4-MeO-Ph
30	$OCHF_2$	H	H	Cl	Cl		4-MeO-Ph
31	$OCHF_2$	H	H	H	F	$CH_2CH=CH_2$	Ph
32	$OCHF_2$	H	H	F	F	$CH_2C\equiv CH$	Ph
33	OCF_3	H	H	H	F		Ph
34	OCF_3	H	H	F	F		Ph
35	Cl	H	H	H	F		Ph
36	Cl	H	H	F	F		Ph
37	Cl	H	H	H	F		4-F-Ph
38	Cl	H	H	F	F		4-F-Ph
39	Cl	H	H	H	F		4-MeO-Ph
40	Cl	H	H	F	F		4-MeO-Ph

[0015] As examples for the benzimidazole compounds specified in the present invention, thiophanate methyl, benomyl, carbendazim and thiabendazole, are given.

[0016] And, iprodione and procymidone are given as examples for the dicarboxyimide compounds, iminoctadine is given as an example for the guanidine compound, carboxin, mepronil, flutolanil, pencycuron, furametopyr and thifluzamide are given as examples for the acid amide compounds, cyprodinil, mepanipyrim and pyrimethanil are given as

examples for the anilinopyrimidine compounds, dimethomorph is given as an example for the cinnamic acid derivative, probenazole is given as an example for the benzisothiazole compound, diethofencarb is given as an example for the N-phenylcarbamate compound, fosetyl is given as an example for the organophosphorous compound, and as SBI type compounds, bromoconazole, cyproconazole, diphenoconazole, fenbuconazole, flusilazole, flutriafol, hexaconazole, propiconazole, tebuconazole, tetraconazole, triadimefon, triadimenol, triflumizole, bitertanol, imibenconazole, diniconazole, fenpropimorph, fenpropidine, tridemorph, epoxyconazole, fluquinconazole, prochloraz and metoconazole are given, and one or more than two compounds of the compounds recited above can be used as the active ingredients for the fungicidal composition according to the present invention.

[0017] In the preparation of the fungicidal compounds according to the present invention, the combining rate of the benzamidoxime compound represented by the general formula (I) and a known fungicide selected from a group consisting of benzimidazole compounds, dicarboxyimide compounds, guanidine compounds, acid amide compounds, anilinopyrimidine compounds, cinnamic acid derivatives, benzoisothiazole compounds, N-phenylcarbamate compounds, organophosphorous compounds and SBI type compounds can be freely fixed over a wide range, however, the combining rate is normally in a range of 1:0.01-1,000, and preferably in a rage of 1:1-100.

[0018] The fungicidal composition of the present invention is commonly admixed with solid carriers, liquid solvents, gaseous diluents, etc., added with surface active agents and other inert ingredients, if required, and is used in a formulation form, such as oily solution, emulsifiable concentrate, wettable powder, granules, powder, aerosol, suspension, foaming preparation, microcapsules, ULV and paste. In these formulations, the active ingredients as exemplified above are contained at the total content of from 0.1 to 99.9 wt%, and more preferably from 0.2 to 80 wt%.

[0019] At the formulation of the fungicidal composition, fine powder and granules including clays, such as kaolinite, diatomaceous earth, synthesized silicon hydroxide, fubasami clay, bentonite and acid clay, talc, and other inorganic minerals, such as sericite, silica powder, sulfur powder, activated carbon and calcium carbonate, are used as the solid carrier used for the formulation, whereas alcohols, such as methanol and ethanol, ketones, such as acetone, methyl ethyl ketone and cyclohexanone, aromatic hydrocarbons, such as toluene, xylene, ethyl benzene and methyl naphthalene, non-aromatic hydrocarbons, such as hexane, cyclohexane and kerosine, esters, such as ethyl acetate and butyl acetate, nitriles, such as acetonitrile and isobutylonitrile, ethers, such as dioxane and diisopropyl ether, acid amides, such as dimethylformamide and dimethylacetamide, halogenated hydrocarbons, such as dichloroethane and trichloroethylene, are used as the liquid solvent for the formulation, and carbon dioxide, butane gas, fluorocarbon, etc. are used as the gaseous diluents, namely spray gas, for the gaseous formulation.

[0020] As examples for the surface active agent, alkyl sulfates, alkyl sulfonates, alkyl aryl sulfonates, alkyl aryl ethers and their polyoxyethylenated compounds, polyethyleneglycol ethers, polyhydric alcohol esters, sugar alcohol derivatives and the like are given.

[0021] As other inert ingredients to be used for the formulations as described above, a sticking agent and a dispersing agent including casein, gelatin, polysaccharides, such as starch, gum Arabic, cellulose derivatives and alginic acid, ligninic acid derivatives, bentonite, synthesized aqueous polymers, such as polyvinyl alcohol, polyvinyl pyrrolidone and polyacrylic acid, and a stabilizing agent including PAP (acidic isopropyl phosphate), BHT (2,6-di-tert-butyl-4-methylphenol), BHA (2-/3-tert-butyl-4-methoxyphenol), vegetable oil, mineral oil, fatty acids, fatty acid esters, etc. are given.

[0022] The prepared formulations containing the fungicidal composition according to the present invention are applied either directly or after diluting them with water or the like to plants, to water surface or to soil. In addition, the formulated fungicidal composition can be used in combination with other fungicides, herbicides, fertilizers and soil conditioners. The applying dose of the fungicidal composition of the present invention varies depending upon the combining ratio of the active ingredients, namely the compound represented by the general formula (I) and any of benzimidazole compounds, dicarboxyimide compounds, guanidine compounds, acid amide compounds, anilinopyrimidine compounds, cinnamic acid derivatives, benzoisothiazole compounds, N-phenylcarbamate compounds and organophosphorous compounds, climatic condition, formulated form, application method, place to apply, objective plant disease and objective crop, however, the applying dose per hectare is normally in a range of from 1 to 1,000 g, and more preferably in a range of from 10 to 100 g. When using any of the emulsifiable concentrate, the suspension, the liquid, or the like of the fungicidal composition after diluting with water, the applying concentration is preferably in a range of from 1 to 1,000 ppm, and more preferably from 10 to 250 ppm. Whereas, the formulations, such as granules and powder, are normally applied directly without dilution.

[0023] The combined fungicidal composition according to the present invention is applicable for controlling agriculturally important plant diseases in wide range, and the representative examples for the plant diseases are presented in the following.

Paddy Rice	Rice blast (Pyricularia oryzae) Sheath blight (Rhizoctonia solani) Bakanae disease (Gibberella fujikuroi) Helminthosporium leaf spot (Cochilobolus miyabeabeanus)
Barley	Loose smut (Ustilago nuda)
Wheat	Scab (Gibberella zeae) Leaf rust (Puccinia recondite) Eye spot (Pseudocercosporella herpotri-

	choides) Glume blotch (Leptosphaeria nodorum) Powdery mildew (Erysiphe graminis f.sp.tritici) Fusarium snow blight (Micronectriella nivalis)
Potatoes	Late blight (Phytophthora infestans)
Groundnuts	Leaf spot (Mycosphaerella arachidis)
Sugarbeets	Cercospora leaf spot (Cercospora beticola)
Cucumber	Powdery mildew (Sphaerotheca fuliginea) Sclerotinia rot (Sclerotinia sclerotiorum) Gray mold (Botrytis cinerea) Downy mildew (Pseudoperonospora cubensis)
Tomatoes	Leaf mold (Cladosporium fulvum) Late blight (Phytophthora infestans)
Egg plants	Black rot (Corynespora melongenae)
Onion	Gray mold (Botrytis allii)
Strawberries	Powdery mildew (Sphaerotheca humuli)
Apples	Powdery mildew (Podosphaera leucotricha) Scab (Venturia inaequalis) Blossom blight (Monilinia mali)
Japanese persimmon	Anthracnose (Gloeosporium kaki)
Peaches	Brown rot (Monilinia fructicola)
Vine trees	Powdery mildew (Uncinula necator) Downy mildew (Plasmopara viticola)
Pears	Rust (Gymnisporangium asiaticum) Black spot (Alternaria kikuchiana)
Tea plants	Leaf spot (Pestalotia theae) Anthracnose (Colletotrichum theae-sinensis)
Citrus	Scab (Elisinoe fawcettii) Blue mold (Pennisillium italicum)
Lawn	Sclerotinis rot (Sclerotinia borealis)

Best Modes for Carrying out the Invention

[0024] Now, the examples for the fungicidal composition according to the present invention are described below, however, the active ingredients, the additives, the adding rates and the formulation types should not be limited to the scope of the description, those which can be replaced with other substitutes over a wide range. The part indicated in the examples represents the part by weight.

(Example 1) Emulsifiable Concentrate	
Compound No. 1 presented in Table 1	10 parts
flusilazole	160 parts
solvesso 200	220 parts
polyoxyethylene tristyrylphenyl ether	100 parts
polyoxyethylene tristyryl phenyl ether sulfate	10 parts
NMP (N-methyl-2-pyrrolidone)	500 parts
(Example 2) Emulsifiable Concentrate	
Compound No. 1 presented in Table 1	10 parts
tebuconazole	200 parts
solvesso 200	220 parts
polyoxyethylene tristyrylphenyl ether	100 parts
polyoxyethylene tristyryl phenyl ether sulfate	10 parts
NMP (N-methyl-2-pyrrolidone)	460 parts

Advantageous Effect of the Invention

(Test Example 1) Antifungal Test on Sugar beet Leaf Spot

[0025] Sugar beet leaf spot fungus (*Cercospora beticola*) grown beforehand on a potato agar culturing medium containing 2% saccharose was taken out by using a cork borer, and the fungus was placed onto a potato agar culturing

medium containing 2% saccharose and the fungicidal composition at a prefixed concentration. After growing the fungus at 25°C under dark condition for 8 days, the diameter of the grown fungus was measured.

Effectiveness Rate (%)= [1-(Diameter of Colony in Treated Plot / Diameter of Colony in Untreated Plot)] x 100

[0026] The expectable effectiveness rate E was calculated based on Colby's equation (Weed., 15, 20-22, 1996) and was compared with the obtained results in the present test.

$$E = x + y - (X \cdot y/100)$$

[0027] E represents an expectable effectiveness rate in % when using active compounds A and B at the concentration of m and n, respectively, x represents an effectiveness rate when using the active compound A at the concentration of m, and y represents an effectiveness rate when using the active compound B at the concentration of n.

Table 2

Active Compound			Actual Effectiveness Rate(%), Figures in () are Calculated Effectiveness Rate(%)	
		Water (Check)	Compound No.1 in Table 1	
	Concentration of Active Compound in Spray Solution (ppm)	-	1	0.1
Water (Check)	-	0	56	0
Thiophanatemethyl	10	6	75(59)	19(6)
Benomyl	1	6	75(59)	38(6)
Iprodione	10	6	94(59)	88(6)
Iminoctadine	1	69	94(86)	94(69)
Carboxin	1	0	75(56)	25(0)
Cyprodinil	1	50	88(78)	56(50)
Dimethomorph	10	6	75(59)	25(6)
Probenazol	100	13	69(62)	44(13)
Procymidone	1	13	88(62)	25(13)
Diethofencarb	0.1	75	100(88)	100(75)
Fosetyl	100	6	59(56)	25(6)

(Test Example 2) Efficacy Test on Wheat Powdery Mildew (Field Test)

[0028] The fungicidal composition prepared according to the example 1 and example 2 was diluted at a prefixed concentration and applied once to wheat at the young shooting stage by using a sprayer with carbon dioxide pressure. On 26 days after the spray, the rate of infected leaves was examined.

[0029] The results were shown in Table 3.

Table 3

Composition	Dose (gai/ha)	Incidence (%)
Compound No.1 + flucilazole	12.5 + 200	2.5
Compound No.1 + tebuconazole	12.5 + 250	1.3
Compound No.1	12.5	5.0

Table 3 (continued)

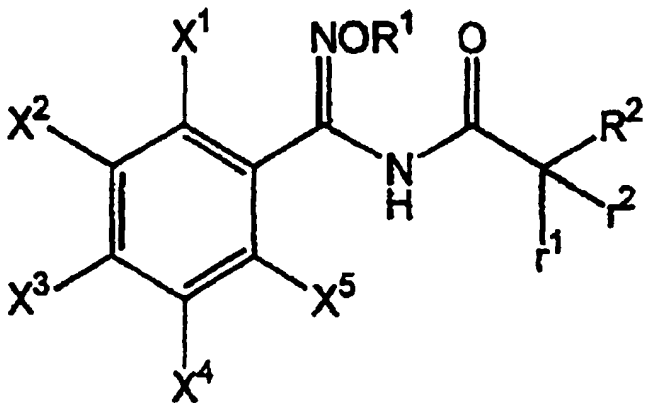
Composition	Dose (gai/ha)	Incidence (%)
flucilazole	200	10.0
tebuconazole	250	6.3
Untreated	0	23.8

Industrial Use of the Invention

[0030] The combined fungicidal composition according to the present invention allows to provide higher fungicidal performance than the one given by the single application of the respective component active ingredient owing to the synergistic action.

Claims

1. A fungicidal composition for agricultural and horticultural use characterized by containing as the active ingredients a benzamidoxime compound represented by a general formula (I);



(I)

wherein R^1 represents halogeno, C_{1-4} alkyl optionally-substituted with C_{3-5} cycloalkyl, C_{2-4} alkenyl optionally-substituted with halogeno or C_{2-4} alkynyl optionally-substituted with halogeno,

R^2 represents phenyl optionally-substituted with halogeno, C_{1-4} alkyl or C_{1-4} alkoxy, or a heterocyclic ring optionally-substituted with halogeno, C_{1-4} alkyl or C_{1-4} alkoxy,
X^1 represents halogeno, C_{1-4} haloalkyl or C_{1-4} haloalkoxy,
X^2, X^3, X^4 and X^5 represent each independently hydrogen, nitro, amino, halogeno, C_{1-4} alkyl, C_{1-4} haloalkyl, C_{1-4} alkoxy, C_{1-4} haloalkoxy, C_{1-4} alkylthio, C_{1-4} alkylsulfinyl, C_{1-4} alkylsulfonyl or C_{1-4} alkylcarbonylamino,
r^1 and r^2 represent each independently hydrogen, amino, halogeno, C_{1-4} alkyl, C_{1-4} haloalkyl, C_{1-4} alkoxy or C_{1-4} alkylthio, or r^1 and r^2 may form in together a carbonyl group, and one or more compounds selected from a group consisting of benzimidazole compounds, dicarboxyimide compounds, guanidine compounds, acid amide compounds, anilinopyrimidine compounds, cinnamic acid derivatives, benzoisothiazole compounds, N-phenylcarbamate compounds, organophosphorous compounds and SBI type compounds.

2. The fungicidal composition for agricultural and horticultural use according to the claim 1, characterized in that the benzamidoxime compound is represented by the general formula (I), wherein R^1 represents C_{1-4} alkyl optionally-substituted by C_{3-5} cycloalkyl, R^2 represents phenyl optionally-substituted with halogeno, C_{1-4} alkyl or C_{1-4} alkoxy, X^1 represents halogeno, C_{1-4} haloalkyl or C_{1-4} haloalkoxy, X^2, X^3, X^4 and X^5 represent each independently hydrogen or halogeno, and r^1 and r^2 represent hydrogen.

3. The fungicidal composition for agricultural and horticultural use according to the claims 1 or 2, wherein the benzimidazole compound is one or more selected from a group consisting of thiophanate methyl, benomyl, carbendazim

and thiabendazole.

4. The fungicidal composition for agricultural and horticultural use according to the claims 1 or 2, wherein the dicarboxyimide compound is one or more selected from a group consisting of iprodione and procymidone.

5. The fungicidal composition for agricultural and horticultural use according to the claims 1 or 2, wherein the guanidine compound is iminoctadine.

6. The fungicidal composition for agricultural and horticultural use according to the claims 1 or 2, wherein the acid amide compound is one or more selected from a group consisting of carboxin, mepronil, flutolanil, pencycuron, furametopyr and thifluzamide.

7. The fungicidal composition for agricultural and horticultural use according to the claims 1 or 2, wherein the anilinopyrimidine compound is one or more selected from a group consisting of cyprodinil, mepanipyrim and pyrimethanil.

8. The fungicidal composition for agricultural and horticultural use according to the claims 1 or 2, wherein the cinnamic acid derivative is dimethomorph.

9. The fungicidal composition for agricultural and horticultural use according to the claims 1 or 2, wherein the benzoisothiazol compound is probenazol.

10. The fungicidal composition for agricultural and horticultural use according to the claims 1 or 2, wherein the N-phenylcarbamate compound is diethofencarb.

11. The fungicidal composition for agricultural and horticultural use according to the claims 1 or 2, wherein the organophosphorous compound is fosetyl.

12. The fungicidal composition for agricultural and horticultural use according to the claims 1 or 2, wherein the SBI type compound is one or more selected from a group consisting of bromoconazole, cyproconazole, diphenoconazole, fenbuconazole, flusilazole, flutriafol, hexaconazole, propiconazole, tebuconazole, tetraconazole, triadimefon, triadimenol, triflumizole, bitertanol, imibericonazole, diniconazole, fenpropimorph, fenpropidine, tridemorph, epoxyconazole, fluquinconazole, prochloraz and metoconazole.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP99/02281

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[6] A01N37/52, A01N55/00, A01N43/653 // (A01N37/52, A01N55:00, A01N43:653)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
Int.Cl[6] A01N37/52, A01N55/00, A01N43/653 // (A01N37/52, A01N55:00, A01N43:653)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP, 10-67730, A (Nippon Soda Co., Ltd.), 10 March, 1998 (10. 03. 98) (Family: none)	1-12
X	JP, 9-235262, A (Nippon Soda Co., Ltd.), 9 September, 1997 (09. 09. 97) (Family: none)	1-12
X	WO, 96/19442, A1 (Nippon Soda Co., Ltd.), 27 June, 1996 (27. 06. 96) & AU, 9641895, B & ZA, 9603219, A & NO, 9702811, B & EP, 805148, A1 & BR, 9510207, A & JP, 8-519662, A & HU, 76989, T & KR, 98700261, A & US, 5847005, A & TW, 344651, A	1-12
Y	JP, 2-6453, A (Nippon Soda Co., Ltd.), 10 January, 1990 (10. 01. 90) (Family: none)	1-12
Y	WO, 97/46097, A1 (Nippon Soda Co., Ltd.), 11 December, 1997 (11. 12. 97) & AU, 9729780, B & EP, 919126, A1	1-12

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
3 August, 1999 (03. 08. 99)	17 August, 1999 (17. 08. 99)
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer
Facsimile No.	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP99/02281

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO, 97/46096, A1 (Nippon Soda Co., Ltd.), 11 December, 1997 (11. 12. 97) & AU, 9729779, B	1-12
A	WO, 97/46092, A1 (Nippon Soda Co., Ltd.), 11 December, 1997 (11. 12. 97) & AU, 9729791, B & EP, 853883, A1 & JP, 10-500427, A	1-12

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